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An extensive approach to unemployment insurance benefits and corporate finance metrics - Labour Productivity

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Abstract

This paper investigates how differences in the unemployment insurance scheme across US states influence firms' financial metrics. I find that, over the 1981-2016 period, higher unemployment insurance benefits are associated with lower financial leverage through a crowding-out effect. In states with more generous UI benefits, creditors are willing to offer more favourable loan conditions, which translates into longer debt maturity and lower interest, increasing the interest coverage ratio. Simultaneously, increasing UI benefits originates moral hazard problems among employees, decreasing their productivity levels. No statistically significant relationship was found between unemployment insurance generosity and an increase in credit ratings.

Keywords

Unemployment risk, Unemployment insurance benefits, Stakeholders, Compensating wage differentials, Capital structure, Productivity, Credit rating, Employee welfare

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Introduction

Unemployment insurance (UI) benefits have an auto-suggestive name for their role as an important pillar of society. When unemployed, people suffer a loss in their income, and the unemployment insurance benefits are meant to offset, at least partially, the foregone wages and allow for some consumption smoothing during the unemployment period. Overall, workers are undeniably worse off upon unemployment. Unemployment comes associated with loss of income, but the consequences are not restricted to the monetary sphere. There has been some research on the psychological and social issues that arise from the unemployment status. (Kalil and DeLeire 2013), for example, studied that losing a job leads individuals to question their purpose in life and even affects the satisfaction they derive from life, which is estimated to reduce by 25 to 50 percent during the unemployment period. Given that unemployment insurance offsets part of the income loss individuals suffer when they become unemployed, the benefits enable some consumption smoothing during this challenging period, which might attenuate not only monetary but also psychological and social pressures.

Some authors have also devoted their research to explore the relationship between the total amount of benefits given to jobless individuals and the length of time they remain unemployed. Solon (1979) and Mortensen (1977), for instance, found evidence of a positive correlation between the two variables. Although the benefits might play an important role in monetary, social and psychological terms, these authors argued that the provision of unemployment insurance benefits can create incentives for jobless individuals to remain unemployed for a longer period, increasing the job search time. In fact, the unemployment's opportunity cost is the foregone salary the jobless earned before becoming unemployed. Unemployment insurance benefits, by replacing at least part of the foregone income, reduce the opportunity cost of unemployment, which might dissuade jobless people to reenter the labor market swiftly. Hence,

increasing the UI benefits, either through a higher weekly amount or a higher duration, might give room to an increase in the duration of unemployment spells.

Other scholars shifted their attention to study how unemployment insurance benefits interfere with workers' decisions and corporate financing policies. The current paper aims to study the impact of unemployment insurance benefits policy on different corporate financial metrics. The objective is to build on the literature of Agrawal and Matsa (2013), exploring the relationship between UI benefits and corporate financial leverage, and to extend the analysis to other corporate financial aspects, such as leverage, workers' productivity, and credit rating upgrades. To address the variables already mentioned, I resorted to several corporate financial indicators (respectively): the debt-to-equity ratio, output per employee, and a dummy variable that takes the value 1 whenever an upgrade of credit rating happens in a given year.

In order to study the impact of a change in the unemployment insurance scheme of each US state on the financial metrics of the corporations, data on the firm's financial aspects was retrieved from Compustat. Overall, in this study, a sample of US firms was followed in the 1981-2016 time frame. The unemployment subsidies and other variables, such as the GDP growth rate and the unemployment rate, collected from the US Department of Labor, the US Bureau of Labor Statistics, and the US Bureau of Economic Analysis websites, were also included in the model to control for the macroeconomic environment. Fixed effects at the firm, year, and state levels were also taken into account in the framework.

The estimates obtained indicate that unemployment insurance subsidies are negatively correlated with leverage, and human capital productivity. All these estimated coefficients are statistically significant, although at different significance levels.

Firstly, a 1% increase in the generosity of unemployment insurance benefits is estimated to decrease the debt-to-equity ratio in 0.004 percentage points, on average, in the following year,

keeping all control variables fixed. In order to avoid paying higher compensating wages to employees and incurring in larger labour costs, firms are forced to adopt conservative financial policies and choose to keep their debt levels low even when unemployment benefits are better. This is due to the fact that, when there are considerable labour costs, wages would start resembling additional debt contracts, which would flood the firm with leverage.

Secondly, a 100 log-point increase in unemployment insurance benefits is estimated to decrease workers' productivity by 5.2 percentage points (in the following year), keeping the remaining variables constant. These results support the hypothesis that a more generous unemployment insurance scheme fosters moral hazard problems, inducing workers to exert lower effort levels. In fact, with higher unemployment benefits, workers' opportunity cost of unemployment decreases and, consequently, incentives to work hard are hindered. This is reflected in a lower output per employee, the measure of worker's productivity.

It is also relevant to mention that higher unemployment insurance benefits are associated with a lower proportion of short-term debt on the total amount of debt employed in firms' balance sheet, keeping other explanatory variables in the model constant. This implies that companies in states with better UI benefits tend to issue longer-term debt, decreasing the short-to-long-term debt ratio. An increase in unemployment insurance benefits covers, at least partially, the wage premium that workers would eventually demand to the company if they perceive a higher risk of becoming involuntarily unemployed. The lower expenditures with labour reduce the company's operating costs, which improves the financial ratios investors base their due diligence and covenants on when lending out money to a company. In this scenario, they tend to offer the company more favorable financial conditions, leading to an increase in debt

maturity. So, more generous unemployment schemes are associated, with a longer debt maturity.[1]

More generous unemployment insurance benefits, on the other hand, are estimated to be positively correlated with the interest coverage ratio and upgrade in the credit ratings. A 1% increase in the unemployment insurance generosity is associated, on average, with an increase of 0.031 percentage points in the interest coverage ratio after one year, keeping the other regressors fixed, with the estimated coefficient being statistically significant at any reasonable significance level. In states where unemployment insurance is more generous, workers do not feel the necessity to ask for such a high compensating wage. As the corporate labour spending decreases, firms can more easily face their interest obligations. As a consequence, lenders perceive these firms as safer investments and provide them better loan terms, in the form of lower interest rates. Companies take advantage of this, which makes their interest coverage ratio strengthen[2]. Although the coefficient on the credit rating regression model shows a positive correlation between an upgrade in credit ratings and more generous unemployment insurance benefits, it does not hold statistical significance, making its interpretation meaningless.

All in all, the firms from the sample are predicted to react to more generous unemployment subsidies by lowering their debt-to-equity ratio and the proportion of short-term debt on total debt carried in their balance sheet, while increasing their interest coverage ratio. Workers, on

[1] This work project was developed in group, and a detailed analysis of debt maturity was performed by Marta Fernandes, student number 38914. Hence detailed information regarding this metric can be found in her individual report. For the sake of completeness and understandability of the analysis performed, her conclusions are included in this report.

[2] This work project was developed in group, and a detailed analysis of interest coverage was performed by Rita Fernandes, student number 38903. Hence detailed information regarding this metric can be found in her individual report. For the sake of completeness and understandability of the analysis performed, her conclusions are included in this report.

their end, are estimated to react to more generous unemployment insurance benefits by lowering their productivity, as measured by the output per employee in this model.

This work project is organized as follows. The first section provides an overview of the institutional setting of the unemployment insurance programme in the United States. It is followed by the Data and Methodology section, which describes the variables incorporated in the model and the respective summary statistics, as well as the methodology of the framework presented. The subsequent section develops an extensive theoretical background on leverage, human capital productivity, and credit ratings. In this theoretical section, there is a collection of the main findings from a wide variety of academics that connect each of the aforementioned variables to the unemployment insurance programme. The idea is to develop the model and confirm if the empirical results are backed by any of the theoretical frameworks reviewed. In order to test the robustness of the results obtained, unemployment insurance generosity was also measured by its maximum duration and then by the maximum weekly benefit amount. Since the sample is composed exclusively by American firms, it was important to pay special attention to the period of the Great Financial Crisis, since the United States was deeply impacted by this event. In an attempt to remove potential abnormal shocks caused by this event, the years of 2007 and 2008 were subsequently removed from the sample. Overall, the results obtained appear to be robust to all of these robustness checks.

Literature Review: Institutional Setting on UI

Unemployment has been at the centre of interest of many theorists and public policymakers because of its ramifications. It has social impacts on the individual that becomes unemployed, and also affects the financial aspects of both the unemployed person particularly and the overall economy.

The risk of unemployment affects individuals' choices since when unemployed, individuals bear several additional costs by seeing themselves without any kind of income to face their most basic necessities (in the case of no unemployment insurance system). Generally, the US Bureau of Labour Statistics considers an individual unemployed if that person does not have a job, has been actively seeking for a job in the last 4 weeks, and is currently available for work. This study focuses on a specific type of unemployment: involuntary unemployment. Hence, it is important to establish the meaning of involuntary unemployment: Christiano, Trabandt, and Walentin (2021) develop a monetary model in which individuals are better off if they are employed than if they are unemployed, in this sense unemployment is involuntary since no rational individual would willingly choose to be unemployed.

The significant costs faced by employees when they become involuntarily unemployed can be both monetary and psychological. The existing literature is extensive in this matter and it deeply studies and quantifies these additional costs faced by individuals when unemployed. Dynarski et al. (1997) document that households see their consumption decrease following unemployment, which is particularly strong for low-income families. These families actually spend a larger share of their income on the consumption of essential goods, hence income loss due to unemployment can be particularly harmful to them. Another study concludes that some job losers find it difficult to get a new job and see their wages reduced after being displaced (Farber 2005). In a more recent study, Knabe and Rätzel (2011) find that the nonpecuniary costs

that come with unemployment are twice as large as the pecuniary costs, arguing that unemployment causes a loss in the individuals' quality of life. Moreover, for parents, involuntary employment separations may affect their children's school performance, provoking grade repetition and suspension (Kalil and Ziol-Guest 2008). Gormley, Liu, and Zhou (2010) find that investment (namely stock market participation) and saving decisions may also be compromised depending on government safety nets.

The unemployment risk, alongside the employee's risk aversion and the costs incurred during the joblessness period, lead workers to demand higher wages in order to compensate them for the costs they incur upon a potential job loss (Agrawal and Matsa 2013). This requirement can be fulfilled either in the private market, through increased wages, or in the public market. In fact, the presence of social insurance programs is often justified by the lack of effectiveness of insurance in the private market at a certain dimension. Hence, the provision of unemployment insurance may have welfare gains as it fills the market failure with a state-contingent payment (Gruber 1997).

In the United States, the Social Security Act of 1935 created a federal-state unemployment compensation program, which primarily aims to help individuals face the negative effects of unemployment, acting as an economic stabilizer, which is especially relevant during recessions. In order to fulfil its primary objective, the unemployment compensation programme offers unemployed individuals a temporary partial wage replacement, through direct weekly payments. In this sense, the unemployment compensation programme can be regarded as a counter-cyclical instrument, since it pays more benefits during downturns and pays fewer benefits, and consequently, builds solvency when the economy is in recovery. Predominantly, the unemployment compensation programme helps eligible unemployed individuals maintain their purchasing power, it facilitates the job search, and to a certain extent, it covers a substantial part of individuals' life necessities. (U.S. Department of Labor 2019, 1-2)

Besides the regular benefit payments anticipated by the unemployment compensation programme, during periods of high unemployment, the Federal law exhibits the possibility for the payment of extended benefits, according to which eligible unemployed individuals may receive benefits for an extended period of up to 13 or 20 weeks (in some cases). (U.S. Department of Labor 2019, 2)

One peculiarity of the United States unemployment compensation programme is that it is based upon Federal-Law, but it is managed by each state's law. This implies that each state has the sovereignty to define its own unemployment compensation programme within the requirements of the Federal framework. Particularly, each state is able to decide on the benefit structure, including eligibility criteria and benefit amount, but the state can also decide on its tax structure, including the base taxable income and the rate at which it is taxed. For instance, in terms of the benefit duration, it is most common for states to have a maximum number of 26 weeks payable, but there are exceptions: Massachusetts has a maximum of 30 weeks of benefits payable and Montana presents a maximum of 28 weeks of benefits payable in 2019. Additionally, it is common among most states that not all individuals enjoy the same time of unemployment insurance: the number of weeks payable usually varies according to the individual's wage in the base period (the period before the unemployment status). (U.S. Department of Labor 2019, 1)

The financing of the unemployment compensation programme is somewhat unique since most of the states require funding through taxes imposed on the employer and only a few states collect taxes on the employee. The tax applied to fund the unemployment compensation programme has changed over time: it started out as 1% of a worker's total wage and in 2011 the Federal tax reached the value of 6%. It is worth mentioning that the law provides a Federal tax credit if employers pay state taxes timely. Overall, the federal tax serves several purposes: funding administrative costs arising from the unemployment compensation programmes,

funding the Federal share of the benefits paid under the programme as well as cash advances made to states in order for them to pay the outstanding benefit to unemployed individuals, and lastly to fund some Federal emergency programmes. Besides the Federal tax, state taxes are also used to finance the respective state's unemployment compensation programme. (U.S. Department of Labor 2019, 7)

Nevertheless, not all unemployed individuals are eligible for the benefits: one needs to demonstrate workforce attachment. This is usually evaluated resorting to the wage amount or the number of weeks worked, during the base period, which usually is a period of four consecutive calendar quarters. Moreover, to be eligible to receive the benefits from the unemployment compensation programme, one must also be able and available to work and actively seeking for a new occupation. The main goal of having such eligibility requirements is to try to ensure that those that are receiving unemployment benefits are actually those who are unemployed, yet it is not their own choice to be in such a situation. (U.S. Department of Labor 2019, 11-12)

The benefits of having an employment insurance scheme seem apparent and reasonable, yet there is no consensus in the literature regarding this topic. Indeed, if the labour market functioned perfectly and without frictions, the costs accrued to unemployed individuals would be negligible, as they would be able to find a new job right away. If this was the case, there would be almost no unemployment risk and thus unemployment insurance would only be subsidizing leisure, or equivalently, creating moral hazard problems. If this was the case, an individual's decisions would resemble the traditional labour-leisure framework, in which an individual chooses the number of weeks that the individual will be unemployed and employed, from a long-term perspective. (Moffitt and Nicholson 1982)

In fact, it is observed that it takes time and effort for an unemployed individual to find a new job. Theorists have developed this intuition into several theoretical models, a family of them are the so-called search models. Mortensen (1977) developed research based on a search model which is rooted in the fact that the information regarding wages in the job market is imperfect. For this reason, individuals' job possibilities are based on a distribution of possible wage offers, in such a way that workers sample from this wage distribution when performing their job searches. In this model, a worker's optimal strategy is to accept the first job offer greater than the reservation wage. In this type of model, unemployment insurance benefits reduce the opportunity cost (wages foregone) of searching for a new job while unemployed. To a certain extent, according to this model, moral hazard effects on job search are progressive, since the payment of unemployment benefits does not change a worker's future income stream which provides incentives for a longer job search duration.

The standard job search models would predict that a more generous unemployment insurance system is associated with more job quality since recipients of unemployment insurance benefits see the costs associated with unemployment decreased and, consequently, are able to spend more time searching for a better job. In a few words, if individuals receive payments associated with unemployment insurance benefits, they are more selective in their job search. Nonetheless, one shall not forget that the effects of unemployment insurance on re-employment wages are twofold. On the one hand, more unemployment insurance makes job searchers who are unemployed more selective, raising re-employment wages. On the other hand, a more generous unemployment insurance scheme induces individuals to increase their unemployment time, which hinders the person's skills and overall decreases their available job opportunities, reducing re-employment wages. Nekoei, Weber, and Linz (2014) find evidence that an increase in potential benefit duration is associated with more time spent jobless, yet the more generous unemployment policy is also associated with higher-paying post-unemployment jobs (wage

effect). This positive wage effect is in favour of the argument that unemployment insurance benefits do not solely subsidize leisure, but they also subsidize job search.

As an extension of the previously mentioned job search model, Dellavigna et al. (2016) provide insights into job search and reference-dependent preferences. The fact that individuals' perceptions and decisions are affected by their reference point is a robust behavioural model and it is widely accepted among scholars. According to this model, after an individual becomes unemployed, the reference point is their previous wage while they were still employed, which is naturally higher than the unemployment benefit received. Therefore, this new unemployment state is especially harmful for the individual and so the search for a new job is intense. Nevertheless, as the individual spends more time unemployed, there is a gradual adaptation to the level of unemployment benefit (that is lower than the wage received when employed) and the initial harmful loss starts to fade. Consequently, the worker will start to decrease the efforts in the job search process, until the termination of the unemployment insurance benefit starts to appear evident and perceptible. As this happens, an abrupt reduction in payments followed by a similar abrupt fall in consumption is anticipated by the worker, and thus effort put into job search intensifies again. This reference-dependent job search model provides important implications for unemployment compensation schemes: according to the model, a stepwise benefit payment can induce unemployed individuals into an optimal level of effort in the job search.

Marinescu and Skandalis (2019) argue that individuals who benefit from more generous unemployment insurance schemes experience a greater loss upon the termination of the period in which they benefit from the unemployment compensation scheme. Consequently, as these individuals anticipate a great loss in income received, they will exert a higher effort in their job search before their benefiting period ends and thus are more likely to find a job during their unemployed period.

Data and Methodology

To develop the study of the impact of unemployment insurance benefits on the key variables of interest (leverage, productivity and credit ratings), data was collected on each state's unemployment insurance laws, on firms' financial statements, on the respective firm's credit ratings, and on individual state's macroeconomic variables.

Similar to Agrawal and Matsa (2013), data regarding each state's unemployment insurance benefits was collected from the annual publications of the US Department of Labour: "Significant Provisions of State Unemployment Insurance Laws" in January of each year, ranging from 1981 to 2016. Since the present study is focused on the US, it is particularly important to highlight that this time range contains not only the years leading up to the 2008 financial crisis but also the years following it. The annual publications of the US Department of Labour contain a considerable amount of information regarding each state's unemployment insurance policy. This department keeps a record of the requirements (for each state, throughout the years), in terms of earnings and employment, that US citizens must fulfil during the base period to have access to the UI programme. Also, annual publications comprehend state-level information on the minimum and maximum weekly benefit amount, the range of the number of benefit weeks payable, and information on taxes, for every year. In the context of this study, particular importance is given to the maximum number of benefit weeks payable and the maximum weekly benefit amount to ascertain the maximum total unemployment insurance benefit, which is then considered as a proxy for the respective state's unemployment insurance generosity.

Following the approach of Agrawal and Matsa (2013) and Darrough, Kim, and Zur (2019), the level of unemployment insurance generosity is measured as the natural logarithm of the product of the maximum weekly benefit amount (in dollars) and the maximum duration (in weeks) in

which benefits are paid – *log_total_benefit*. This variable corresponds to the total (and maximum) amount of unemployment insurance benefits that an unemployment insurance beneficiary is able to receive in each state, over the maximum duration (weeks) of the benefit.

Yearly data regarding the firm's financial statements and the firm's credit ratings was collected from Compustat for the time period in consideration. Unfortunately, the Compustat S&P Ratings database was discontinued in 2017 and only provided information until 2016, which, for consistency purposes, limited the whole analysis to this year. Overall, the dataset incorporates 16,879 year-firm pairs with non-missing observations, however, after performing the various regressions with lags and firm-, state- and year-fixed effects, only 13,676 observations are accounted for. Due to the time-demeaning process (part of the fixed effects estimation), one degree of freedom is lost for each cross-sectional unit (each firm).

In order to evaluate the relationship between a firm's capital structure and unemployment insurance benefits, the ratio of total debt to equity (*de_ratio*) was taken into consideration in the analysis.

Another key focus of the current study is the impact of the generosity of unemployment insurance benefits on labour productivity. While several approaches can be undertaken to measure employee productivity, this study reproduces the one of Darrough, Kim, and Zur (2019), and thus output per employee, measured in thousands of dollars, was taken as a proxy for labour productivity (*output_per_emp*). In this context, output per employee is computed as the firm's output divided by the number of firm employees (which are reported in thousands). In this framework, the output is measured as the sum of the firm's sales and the firm's inventories, which are both measured in millions of dollars. The firm's inventories are added to the picture in an attempt to capture those goods that were indeed produced by employees but were not sold yet and consequently, are not accounted for in the sales component. In this sense,

only incorporating a firm's sales would possibly be misleading, as the model would potentially underestimate the goods produced by employees.

A firm's ability to meet its interest obligations on its outstanding debt is measured by the interest coverage ratio (*intcov_ratio*). This ratio is defined as the ratio between a firm's earnings before interest and taxes (EBIT) and the interest expenses.

A firm's debt maturity is an extremely complex variable, since it depends on several factors and changes constantly, as the firm often celebrates new debt contracts while simultaneously, some of the firm's already existing debt expires. In an attempt to have more clarity in the interpretation of the results, this study uses the proportion of short-term debt in a firm's total debt (*short_debt*) to shed some light on the firm's choice of shorter- vs longer-term debt. Generally speaking, if a firm presents a higher proportion of short-term debt, it is an indication that the firm is mostly facing short-term obligations (maturing in less than a year).

Lastly, data on the firms' S&P credit rating was also collected. Indeed, this study is focused on the S&P's long-term Issuer Credit Rating, which reflects a current opinion focusing on the firm's creditworthiness and the respective ability, and willingness, to meet its long-term financial obligations as they are due. This long-term Issuer Credit Rating ranges from a classification of AAA, reflecting a firm's strong capacity to respond to its financial obligations, to CC, which classifies a firm as extremely vulnerable. In the context of this study, a new dummy variable was created, which takes on the value of 1 if a given firm improved its credit rating from the previous year to the current year, and 0 otherwise (*increase_cr*).

In what regards to the control variables, the approach of Agrawal and Matsa (2013) was followed, and thus, several other financial variables that are commonly thought of as impacting a firm's financial policies were included in the model. When analysing a firm's capital structure, it is particularly important to take into consideration the firm's proportion of fixed assets, as

these assets are the type of assets that have the potential to be used as collateral for debt. Henceforth, in order to have an approximation of those assets that can potentially be used as collateral, the proportion of intangible assets was first calculated as the ratio between total intangible assets and total assets. Then the proportion of tangible assets (*tan_to_assets*) was calculated from this ratio, considering that the sum of tangible and intangible assets is total assets. In order to control for a firm's size, the total gross sales amount, which is presented in million dollars, was introduced in the regressions, and then the natural logarithm was applied to this variable (*log_sales*). Moreover, it is also important to consider a firm's capacity to generate value from its assets (its profitability), thus return on assets (*ROA*) was considered. Following a similar rationale, as a means to control for a firm's investment opportunities, the book-to-market ratio (*BM*) was taken into consideration. Lastly, in the leverage regression, the interest coverage ratio was introduced as an additional control variable, as to prevent an omitted variable bias problem.

One particularity of the approach taken in this study is that each state of the US has its own macroeconomic environment, hence disregarding this fact could potentially mislead the results obtained. Indeed, unemployment insurance benefits tend to move with changes in the local macroeconomic environment, thus it is important to account for the economic panorama in the model. Overall, individual state's macroeconomic data controls for contemporaneous local macroeconomic conditions, which are inherently related to the variables of interest. In particular, for each year, each individual state's unemployment rate (*unemployment_rate*) was retrieved from the US Bureau of Labor Statistics and the GDP growth rate (*gdp_grate*) was retrieved from the US Bureau of Economic Analysis, as to include both variables in the econometric model.

Table 1. Summary statistics. The sample includes a total of 16,879 year-firm pairs with non-missing observations. The period under consideration ranges from 1981 to 2016 and the sample's geography is limited to the United States. The sources of the data are Compustat, US Department of Labor, US Bureau of Labor Statistics and US Bureau of Economic Analysis. Compustat data was winsorized at 1% tails.

	Mean	SD	Min	Max	p25	p50	p75
Log max total benefit	9.069	0.379	7.912	10.389	8.795	9.057	9.336
Max total weeks	25.934	1.625	12	30	26	26	26
Max total amount	358.649	135.416	105	1083	261	336	436
Debt-to-Equity Ratio	2.358	2.972	0.312	22.882	1.098	1.615	2.439
Output per Employee	0.453	0.552	0.036	3.442	0.166	0.277	0.482
Interest Coverage Ratio	9.116	15.000	0	107.636	2.572	4.484	9.195
Short-term to Total Debt	0.133	0.165	0	0.829	0.018	0.074	0.181
Proportion of Tangible Assets	0.814	0.198	0.234	1	0.700	0.882	0.985
Log Sales	7.838	1.446	4.358	11.369	6.878	7.795	8.799
Return on Assets	0.152	0.067	0.015	0.380	0.106	0.141	0.186
Book-to-Market Ratio	0.634	0.439	0.049	2.491	0.322	0.530	0.839
Unemployment Rate	0.059	0.018	0.021	0.137	0.047	0.055	0.068
GDP Growth Rate	0.049	0.028	-0.088	0.167	0.035	0.049	0.067

Summary statistics describing the main variables are reported in Table 1. It is important to note that the highest maximum number of weeks for which an individual can receive unemployment benefits is 30 weeks, while the lowest maximum number of weeks is 12. Moreover, the most common duration (mode) of unemployment benefits is 26 weeks, which coincides with the mean of the sample. Although there is not a lot of dispersion in the duration of unemployment insurance, and in fact, most states are concentrated around the mean duration, it is considered that there is enough variation to assess the effects of unemployment insurance schemes. This is even more convincing looking at the measure of unemployment insurance generosity after performing the referred transformations. The average log total benefit is approximately 9, which is translated into a dollar amount of approximately $8,103. Missouri has the all-time minimum total unemployment benefit an individual is able to receive, which takes a value of $2,730. This contrasts with Massachusetts, which is the most generous regarding unemployment insurance since a beneficiary is able to receive an all-time high of $32,490. All the other variables of interest also present considerable variations guaranteeing the possibility of drawing conclusions

from the analysis: in the sample, output per employee ranges from a value of $36 to a value of $3,442; there are firms with interest coverage ratios as low as 0, and firms with interest coverage ratios as high as 100%; similarly, the firms' proportion of short-term debt reaches minimum values of 0 (limit case in which firms do not register any short-term obligations), and it reaches a maximum value of 83%.

This empirical research paper resorts to panel data – meaning that each entity is followed over time (a time series) for each member of the dataset (cross-sectional) – to draw some conclusions regarding unemployment insurance benefits and their impact on several firms' performance metrics. In essence, I am combining time series and cross-sectional data, as both of these dimensions are present in panel data. Particularly, I am following the same company over time. With this type of data, I will be able to study how lags may influence the results. This is especially relevant for this research, as I expect changes in the unemployment insurance scheme to have a delayed impact on the firms' key metrics. In other words, it is anticipated that the effects of altering the unemployment insurance benefits will not be immediately reflected on the other variables, but they will rather take some time after the policy change is first announced to be noticeable.

An additional characteristic of this dataset is that it is an unbalanced panel because there are missing years for some of the cross-sectional units (firms). There may be data available for different time periods depending on the firm being followed. For instance, Lone Star Industries (LCE) has data for four years only (from 1985 to 1988, both inclusive) whereas Netflix Inc (NFLX) has data for eight years, though for a much more recent period (from 2009 to 2016, both inclusive). Comparing these two entities, the time range does not even overlap. Another example is Coca-Cola Co (KO), which has data for almost all years, over three decades actually (from 1985 to 2016), overlapping with the two previously mentioned companies.

During the data cleaning process, some observations were dropped, namely those which had missing data on important variables, that is, the ones used as input to compute other variables, or the ones used directly in the regressions. Particularly, the observations with missing values on total assets, the number of employees, intangible assets, inventories, amount of sales, state, book-to-market ratio, return on assets, short-to-long-term debt, debt-to-equity ratio or interest coverage ratio were deleted. Moreover, it does not make sense for some variables to take the value of 0. For instance, the number of employees in a firm should not be 0, and the same reasoning applies for the amount of total assets. This being said, I also eliminated observations where the amount of total assets or the number of employees was equal to 0.

Additionally, when extracting the credit ratings from Compustat, I chose to keep the long-term credit rating, which demonstrates a firm's ability to meet its long-term financial commitments (with maturities of more than one year), instead of the short-term, which in contrast, demonstrates a firm's ability to meet its short-term financial commitments (with maturities of one year or less). It is the most common practice in the literature to define the Domestic Long-Term Issuer Credit Rating as the corporate credit rating (Ashbaugh-Skaife, Collins, and LaFond 2006; Kisgen 2006). I excluded those observations for which the long-term credit rating was NM (Not Meaningful), which indicates that there is no credit watch on the security, and SD (Selective Default), which means that there was a default on a specific issue. It is worth mentioning that in order to analyse the firms' credit ratings annually, I kept only the observations corresponding to the last month of the year ($month = 12$, that is, December), capturing a picture of the firms' credit rating in the closing of that financial year.

The relevant data employed in the regressions which had Compustat as its source was winsorized at 1% tails, meaning that both the top and bottom 1% (1^{st} and 99^{th} percentiles) of the data were adjusted to take on less extreme values (the value of those extreme data points is replaced with the value of their nearest observations). This intends to reduce the weight of

outliers in the data and get a more accurate view of the dataset's mean and standard deviation. Notwithstanding, one should carry out this procedure with caution as winsorizing may bias the data. Although the data analysis becomes easier, there is some data that is inevitably lost. In order not to fall into this "bias trap", I carefully analysed each variable's distribution as well as its outliers.

After calculating some other variables necessary for the analysis, some additional adjustments were performed. Following the Agrawal and Matsa (2013) methodology, the negative interest coverage ratios were set to 0, making this the variable's lower bound. Furthermore, I applied the natural logarithm of *sale*, which was recorded as *log_sales*. Indeed, a rule of thumb for taking logs is that when dealing with a positive dollar amount, this functional form is often applied. Since it allows to narrow the range of this (independent) variable, the estimates can become less sensitive to extreme values. Another reason for taking the log is that it can mitigate, or even eliminate, heteroskedasticity. A distribution is classified as heteroskedastic if the variance of the unobserved factors changes across different segments of the population, where the segments are determined by the different values of the explanatory variables. Oppositely, homoskedasticity implies that the variance of the unobserved errors, conditional on the explanatory variables, is constant. The latter is a crucial assumption to guarantee not only the accuracy and unbiasedness of the estimators, but also the validity of the usual t statistics and confidence intervals.

Regarding the type of regressions performed, I decided to follow the same method as the one implemented by Agrawal and Matsa (2013) – fixed effects regression (fixing firm, state, and year) – to estimate the effect of UI benefits on firms' financial indicators. This statistical regression model allows to control for firm-, state- and year-fixed effects, that is, qualities or individual characteristics specific to each firm, state, and year. If there is any unobserved heterogeneity between groups of these three variables, then the fixed effects model will control

for the omitted variable bias. In practice, the fixed effects model removes the effect of those time-invariant characteristics so that I can assess the net effect of the predictors on the outcome variable. The year (state) fixed effects ensure that the relationship between UI benefits and the dependent variables is not affected by temporary (local) macroeconomic conditions. Firm fixed effects account for leverage trends or management practices specific to each company.

In a fixed effects regression, there is a set of assumptions which must hold. First of all, the fixed effect of each entity i, denoted as a_i, must be included in the regression. Formally, for each i, the model is $y_{it} = \beta_1 x_{it1} + \ldots + \beta_k x_{itk} + a_i + u_{it}, t = 1, \ldots, T$, where β_j represent the parameters to estimate and a_i is the unobserved effect. Secondly, entities must be drawn randomly from the cross-section population. The third assumption concerns sample variation and multicollinearity, stating that each independent variable must change over time (for at least some i) and no independent variable can be an exact linear combination of another (no perfect collinearity). Assumption number four is known as the strict exogeneity assumption and it ensures that the expected value of the idiosyncratic error given the independent variables in all periods and the unobserved effect is zero, for each t: $E(u_{it}|X_i, a_i) = 0$, where X_i contains x_{itj}, $t = 1, \ldots, T, j = 1, \ldots, k$. When these four assumptions hold, the fixed effects estimator is said to be unbiased.

Moreover, the fifth assumption, formally $\mathrm{Var}(u_{it}|X_i, a_i) = \mathrm{Var}(u_{it}) = \sigma_u^2$, for all $t = 1, \ldots, T$, implies homoskedasticity, which means that the variance of the error term, conditional on all explanatory variables and unobserved effect, is constant. For the sixth assumption to hold, the idiosyncratic error must be serially uncorrelated. In more formal terms, $\mathrm{Cov}(u_{it}, u_{is}|X_i, a_i) = 0$. With these last two assumptions, adding to the previous four, the fixed effects estimator of the β_j is BLUE (best linear unbiased estimator). Last but not least, assumption number seven assumes normality for the idiosyncratic error's distribution. Under

all of the aforementioned assumptions, t and F statistics follow exact t and F distributions. If the seventh assumption does not hold, I can rely on asymptotical approximations, but these require large N and small T.

Leverage and Unemployment Benefits

Literature Review

The different forces affecting a firm's capital structure are widely discussed in the financial literature. The most common trade-off theory of corporate finance balances the benefits of debt, which are commonly thought of as the present value of the tax shield arising from debt, and the costs associated with using more leverage, which are linked to the additional costs a firm faces as a result of the stronger possibility of entering in financial distress (Modigliani and Miller 1963). However, research has shown that this relationship is not straightforward and there are many other factors affecting a firm's capital structure. Thus, these other factors should not be dismissed and should be taken into consideration when analysing a company's capital structure. In particular, the several frictions of the labour market can impact a firm's choice of its capital structure and therefore, should be taken into account in the previously mentioned trade-off. It is clear that unemployment insurance benefits affect labour expenses, which should, in turn, affect a firm's choice of capital structure, yet the direction of this impact is not straightforward.

Unemployment insurance might have an impact on a firm's choice of using debt or equity to finance itself, through its impact on workers' bargaining power. Usually, the stronger the workers' bargaining power, the higher their wages, which is translated into a higher input cost faced by firms. In this scenario, a company may use a strategic swap of debt-for-equity to induce a reduction in labour wages: if the company is experiencing low profits and consequently, further investment is necessary to guarantee its survival, a swap of equity for junior debt will pose a threat to this necessary additional investment. Hence, labour unions will be forced to ease their requirements for higher wages, since the company depends on the additional investments to generate future cash flows, without which the company will be unable to pay workers' wages (Perotti and Spier 1993). To the extent that a more generous unemployment

insurance benefit increases workers' bargaining power, firms should see themselves pushed to increase debt as a way to mitigate the consequences of this increased bargaining power (i.e. higher wages leading to underinvestment). Overall, this rationale associates a more generous unemployment insurance scheme with higher debt levels.

Alternatively, unemployment insurance can impact a firm's debt level through its impact on the personal unemployment costs faced by workers if their firm goes bankrupt. If a firm raises its debt levels, there is an increased risk of bankruptcy, and thus workers will require higher wages to compensate them for the additional personal costs they face. Since a more generous unemployment insurance benefit reduces these costs, workers will demand a lower wage premium, enabling firms to increase leverage and experience more debt tax shields, among other benefits (Agrawal and Matsa 2013).

In contrast with the two mechanisms previously presented, that explain why an increase in the generosity of unemployment insurance benefits is associated with higher levels of leverage, some argue that the impact of unemployment insurance on leverage is precisely the opposite. Simintzi, Vig, and Volpin (2015), using data from different countries for the period of 1985-2007, found that improved labour protection laws are associated with lower leverage. The argument is that more employment protection is associated with higher labour fixed costs, in the sense that the firm will have to pay these costs regardless of its performance, creating operating leverage for the company. Moreover, pro-labour regulations turn the labour force more rigid, making it harder for firms to quickly adjust the labour force to their necessities. This way, the labour expenses start resembling debt claims, turning labour contracts into debt-like contracts, in such a way that there is a crowding-out effect of financial leverage. Indeed, if firms were to increase their leverage subsequent to a more generous unemployment insurance programme, as some intellectuals argue, workers would require higher wages to compensate them for additional bankruptcy risk. Those firms, then faced with more labour costs, would

come back with their initial decision and reduce their leverage levels so that workers would not require such high wages. Overall, higher unemployment insurance benefits, a pro-labour regulation, are associated with lower financial leverage.

Results

In this paper, the amount of leverage a firm has is defined as the ratio of its [interest-bearing] debt to its total equity (*de_ratio*). Over the past decade, several studies have been conducted to find whether labour market frictions have repercussions on firms' financing strategy (choosing between the issuance of debt, often in the form of bonds and loans, or equity, mostly in the form of shares). The fact that the existing literature is not consensual on the relation between unemployment insurance benefits and leverage motivated the analysis.

Following Agrawal and Matsa (2013) methodology, I include a one-year lag to account for the delayed impact of unemployment insurance policies on corporate financing decisions.

Furthermore, the model has three fixed effects (firm-, year- and state-fixed effects) which mitigate potential omitted variable bias caused by unobserved effects related to firm, year and state particular characteristics.

Additionally, seven control variables (*gdp_grate, unemployment_rate, log_sales, tan_to_assets, ROA, BM* and *intcov_ratio*) were incorporated in the regression model, which is formally displayed below:

$$\begin{aligned} de\_ratio_{ist} = {} & \beta_1 log\_total\_benefit_{ist-1} + \beta_2 gdp\_grate_{ist} + \\ & + \beta_3 unemployment\_rate_{ist} + \beta_4 log\_sales_{ist} + \\ & + \beta_5 tan\_to\_assets_{ist} + \beta_6 ROA_{ist} + \beta_7 BM_{ist} + \\ & + \beta_8 intcov\_ratio_{ist} + a_i + \mu_s + \gamma_t + \varepsilon_{ist}\,, \end{aligned} \tag{1}$$

where i indexes firms, s indexes states, and t indexes time (each t corresponds to one year), and a_i, μ_j and γ_t denote the firm-, state- and year-fixed effects, respectively.

The results obtained from this regression are depicted in model (1) of Table 2.

Table 2. Leverage and UI benefits. This table showcases the results from the baseline panel regression in Column 1. The robustness checks are presented in the other three columns. Column 2 uses the maximum number of weeks as main regressor, Column 3 uses the maximum benefit amount as main regressor, and Column 4 excludes the financial crisis years, 2007 and 2008. Standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

VARIABLES	(1) max total benefit	(2) max duration	(3) max weekly benefit	(4) no financial crisis
Log max total benefit $_{t-1}$	-0.357*			-0.294
	(0.184)			(0.192)
Max total weeks $_{t-1}$		-0.0189		
		(0.0182)		
Max total amount $_{t-1}$			-0.000567	
			(0.000484)	
GDP Growth Rate	-1.570*	-1.431	-1.387	-2.068*
	(0.929)	(0.926)	(0.922)	(1.079)
Unemployment Rate	5.136**	4.868**	5.053**	4.464*
	(2.429)	(2.430)	(2.429)	(2.697)
Log Sales	-0.180***	-0.180***	-0.180***	-0.165***
	(0.0486)	(0.0486)	(0.0486)	(0.0514)
Proportion of Tangible Assets	0.769***	0.784***	0.759***	1.008***
	(0.225)	(0.225)	(0.226)	(0.244)
Return on Assets	-0.712	-0.713	-0.702	-0.330
	(0.458)	(0.458)	(0.459)	(0.502)
Book-to-Market Ratio	-0.998***	-1.000***	-1.002***	-0.945***
	(0.0675)	(0.0675)	(0.0675)	(0.0731)
Interest Coverage Ratio	-0.0175***	-0.0176***	-0.0176***	-0.0171***
	(0.00176)	(0.00176)	(0.00176)	(0.00192)
Constant	6.938***	4.190***	3.906***	6.005***
	(1.751)	(0.688)	(0.520)	(1.826)
Observations	13,676	13,676	13,676	11,963
R-squared	0.571	0.571	0.571	0.578

In model (1), all coefficient estimates, except for *ROA*, which stands for return on assets and is included to control for firms' profitability, present some statistical significance. First and foremost, the model predicts a negative effect of unemployment insurance generosity on leverage, with the coefficient being statistically significant at the 10% significance level. In more detail, a 1% increase in unemployment insurance generosity is expected to decrease, on average, the proportion of debt relative to equity by 0.004 in the following year, keeping all control variables fixed. This favours the theory defended by Simintzi, Vig, and Volpin (2015),

which posits that labour expenses create operating leverage for the firm by increasing labour force rigidity and thus converting labour contracts into debt-like contracts. In this sense, there is a crowding-out effect of financial leverage after an improvement in the unemployment scheme conditions. There are several possible reasons why these results differ from those of Agrawal and Matsa (2013). Firstly, the time period differs in the two studies: whilst Agrawal and Matsa (2013) collect data from 1950 to 2008, I collect data from 1981 to 2015. This is especially relevant since there is a clear upward trend in the average total unemployment insurance benefit (Appendix, Figure 1). Indeed, after 2008, there is a jump in the average level of benefits an unemployed individual is able to receive. Another striking difference to Agrawal and Matsa (2013) is that these authors focus on typical BBB-rated firms, which is not my case. Since a firm's credit rating impacts the amount debt a firm is able to get, it naturally impacts its debt-to-equity ratio. The power of the baseline model, as measured by R-squared, indicates that around 57.1% of the variation in leverage is explained by the variation in the regressors.

Once established this relation, it is important to test its robustness, especially if it is not very statistically significant, which is the case. For this purpose, three additional models are designed: two of them, particularly models (2) and (3), consider different proxies for unemployment benefits, capturing workers' sensitivity to changes in the benefit duration or the total amount received, and model (4) ignores the abnormal years of 2007 and 2008 marked by a deep crisis – the global financial crisis – which had the US amongst its main victims, but spilled over to the economy all over the world. The results are presented in Table 2.

In model (2), the main independent variable (*log_total_benefit*) is replaced by the maximum number of weeks for which workers who become involuntarily unemployed can benefit from the state aid (*max_weeks*). So, the maximum duration of the unemployment insurance benefit is used as a proxy for unemployment generosity. The theoretical model is presented below (please note that all the control variables are represented in the *Controls*):

$$de\_ratio_{ist} = \beta_1 max\_weeks_{ist-1} + \beta_2 Controls_{ist} + a_i + \mu_s + \gamma_t + \varepsilon_{ist} \quad (2)$$

In model (3), instead of *max_weeks*, the other input used to calculate *log_total_benefit*, *max_amount,* is considered. Rather than the duration, the third model takes the weekly benefit amount (*max_amount*), in dollars ($), to measure the unemployment generosity. The regression considered is as follows:

$$de\_ratio_{ist} = \beta_1 max\_amount_{ist-1} + \beta_2 Controls_{ist} + a_i + \mu_s + \gamma_t + \varepsilon_{ist} \quad (3)$$

Finally, model (4) resembles the baseline model formally, but it excludes the period of the financial crisis (2007 and 2008).

As opposed to model (1), the main predictor is not statistically significant at any reasonable significance level for any of the three new models. Therefore, this model fails all the robustness tests, suggesting that the results of the model (1) should be not blindly relied upon. Therefore, no robust conclusion should be drawn regarding the relation between unemployment insurance generosity and leverage.

The exclusion of 2007 and 2008 from the sample, in model (4), barely result in any change in the R-squared. This indicator of the model's strength sees only a slight increase from 57.1% to 57.8%. Hence, the financial crisis does not seem to have played as an important role in this association as it did in the interest coverage ratio association with the unemployment insurance generosity, for instance.

Labour Productivity and Unemployment Insurance

Theoretical Background

The risk of unemployment affects individuals' choices because of the abrupt decrease in income an individual faces upon unemployment. As a matter of fact, unemployment insurance changes an individual's outside options and raises the reservation wages (Topel 1983). As a matter of fact, labour (coupled with capital) is an essential input for a company's functioning, yet it is an extremely complex force: by hiring employees, firms get exposed to the frictions of the labour market as well as to the strategic acts of employees, as they are able to freely choose their employer, as opposed to capital (Matsa 2018).

The impact of unemployment insurance on workers' productivity is unclear *a priori* as there are two opposite effects in place. On the one hand, a higher level of unemployment insurance might make workers feel more shielded against the hazardous effects of unemployment, and consequently, they might become more indifferent and less hardworking, harming their overall productivity (Darrough, Kim, and Zur 2019). In other words, unemployment insurance benefits generate moral hazard problems. On the other hand, unemployment insurance might affect the type of jobs an individual is able to get: Acemoglu and Shimer (1999) argue that unemployment insurance can improve the allocation of resources in the job market by allowing workers to engage in jobs that are more difficult to get but that are simultaneously more productive. In a hypothetic economy without any type of unemployment insurance, workers may take on less risky and lower productivity jobs, that are easier to obtain, to minimize their losses while unemployed. Moreover, if individuals benefit from unemployment insurance while unemployed, they can spend more time searching for the right type of job that better fits their individual capabilities and also be more selective regarding the jobs they accept, thus improving the match between workers and jobs.

Darrough, Kim, and Zur (2019) discuss unemployment and the two distinct theories of involuntary unemployment, arising due to the imperfect functioning of the labour market. This means that wages do not adjust perfectly to clear off the market and hence, there exists involuntary unemployment.

The compensating wage differential theory is rooted in the mismatch between the supply and demand for labour. There are many underlying factors of this mismatch, such as imperfect information, the unwillingness of workers to move to places where the demand for their labour exists or even the fact that wages are sticky. This mismatch between labour supply and demand coupled with the varying risk of unemployment across different industries creates the need for higher wages in order to compensate the risk-averse workers, who are subject to more unemployment risk. The idea of compensating wage differentials dates back to Adam Smith (1887, p.120), who argued that *"The high wages of those workmen, therefore, are not so much the recompense of their skill, as the compensation for the inconstancy of their employment"*.

In this setting, unemployment insurance functions as a risk-sharing mechanism: if unemployment insurance is more generous, the cost of being unemployed is reduced and, consequently there is a reduction in the required compensating wage differentials. Since employers are not required to pay as much to their employees (lower wage differentials), they are induced to increase employment levels. With a higher employment level, it is unlikely that firms are going to perform extreme capital deployments (substitution of labour for capital), henceforth their capital-to-labour ratio is decreased. Even though higher employment levels reduce average and marginal productivity, the impact on overall firm productivity is unclear (due to the effect on capital productivity).

The efficiency wage theory is closely related to the moral hazard problem arising from the existence of unemployment insurance benefits. An underlying assumption of this theory is that

workers are both risk- and effort-averse and that it is virtually impossible for employers to observe workers' efforts. Consequently, firms are pushed to ration jobs attempting to pose a threat of unemployment to workers (Shapiro and Stiglitz 1984), in such a way that workers have fewer incentives to neglect their work responsibilities, thus mitigating the moral hazard created by unemployment insurance benefits. Overall, the disciplining behaviour carried out by employers leads to lower employment and higher wages, which increases firms' capital-to-labour ratio (substitution of capital for labour). Analogously to what happens in the compensating wage differentials theory, the impact on total firm productivity is also unclear *a priori*, even with increases in the average and marginal productivity of labour due to the lower employment level. Yet, this impact on worker's productivity is also not straightforward: on the one hand, lower employment levels are associated with higher labour productivity, but on the other hand, the incentives to shirk lead to a lower labour productivity. Indeed, if the penalty for misbehaving (lower employment) is not effective and thus the moral hazards arising are stronger, there will be lower levels of labour productivity.

Increases in unemployment insurance benefits intensify even more the aforementioned moral hazard problems, meaning that workers will face even lower costs of unemployment (a lower penalty for misbehaving) and are receiving a relatively higher wage (as a consequence of low employment), providing them with even more incentives to exert low effort. Thereafter, there will be further decreases in employment and, accordingly, higher wages in an attempt to rule out the misbehaviour of employers.

Nonetheless, it is important to highlight that decreasing available jobs is not the only existing mechanism to solve the moral hazard problem arising from generous unemployment insurance benefits and the literature on this topic is extensive. For instance, Kandel and Lazear (1992) showed that peer pressure, partnerships in the form of profit sharing and certain norms established in the workplace are effective motivators that induce workers to exert high effort.

Faleye and Trahan (2011) argue that a company's ability to create value is closely related to the relationship between the corporation and its stakeholders. Particularly, those corporations that have more labour-friendly practices, either financial or other types, will be able to stimulate their employees, resulting in lower absenteeism, better productivity and overall, a higher firm value. In short, markets appear to attribute significant importance to Corporate Social Responsibility, in such a way that there is a positive relation between labour-friendliness and workers' productivity, as well as total factor productivity and firm value.

To sum up, these two theories provide different intuitions regarding involuntary unemployment: according to the compensating wage theory, unemployment insurance helps reduce the required wage premium to mitigate unemployment risk, whereas, according to the efficiency wage theory, efficiency wages and unemployment risk are a required mechanism to soften the moral hazard problems associated with the unemployment insurance benefits.

Considering the two theories Darrough, Kim, and Zur (2019), find empirical results consistent with the efficiency wage theory, meaning that increases in unemployment insurance benefits create moral hazard problems and thus workers' productivity decreases. This relationship is weakened for firms reporting a higher employee-welfare index, suggesting employee-welfare programs are used as an instrument to alleviate the decreases in employee productivity that follow an increase in unemployment insurance benefits. This corroborates the idea that there are mechanisms, other than job rationing, to induce workers to be hardworking and mitigate the hazardous effects of unemployment insurance benefits.

Results

The organizational structure of the United States unemployment insurance scheme creates a quasi-natural experiment where one is able to compare the different unemployment insurance benefit levels across states and over time. Henceforth, using the data collected from the US

Department of Labor, the US Bureau of Labor Statistics, the US Bureau of Economic Analysis and from Compustat, I resorted to regression analysis to draw some conclusions regarding the impact of unemployment insurance benefits on workers' productivity.

Two hypotheses can be formulated beforehand: a positive beta on the unemployment insurance generosity coefficient would suggest that the unemployment insurance benefits support an individual's job search, allowing for an improved match between individual's skills and job positions; in turn, a negative beta supports the theory arguing that more generous unemployment insurance benefits exacerbate the employee's moral hazard problems, inducing them to exert low effort, which is reflected in lower productivity levels.

To study this subject, the following regression model was estimated:

$$\begin{aligned} output\_per\_emp_{ist} = {} & \beta_0 + \beta_1 log\_total\_benefit_{ist-1} + \beta_2 gdp\_grate_{ist} + \\ & + \beta_3 unemployment\_rate_{ist} + \beta_4 log\_sales_{ist} + \\ & + \beta_5 tan\_to\_assets_{ist} + \beta_6 ROA_{ist} + \beta_7 BM_{ist} + a_i + \mu_s + \\ & + \gamma_t + \varepsilon_{ist}\,, \end{aligned} \tag{4}$$

where, *output_per_emp* is the measure of an employee's productivity, who is working for firm *i*, which is located in state *s*, in year *t.* As it was previously defined in the Data and Methodology chapter, *log_total_benefit* is the log of the total maximum unemployment benefit for state *s*, for the preceding year. Besides, a vector of control variables was introduced, which included: the GDP growth rate and unemployment rate, both in state *s* for year *t*, the log of sales, the proportion of tangible assets, return on assets, and book-to-market ratio, all of these for each company *i*, based in state *s and* for year *t*. Lastly, firm (a_i), state (μ_s), and year (γ_t) fixed effects were introduced to guarantee the most accurate estimations possible.

Table 4 reports the estimation results. These results suggest that a 100 log-point increase in unemployment insurance benefits is associated with a 5.2 percentage points decrease in

workers' productivity (in the following year), keeping the remaining variables constant. Moreover, the coefficient on the maximum total benefit is statistically significant at 5% and 10%. Overall, the results from this analysis suggest that a higher level of unemployment insurance benefits is associated with lower employee productivity.

Some insights may also be retrieved from the coefficients on the control variables included in the regression: the natural logarithm of sales (controlling for a firm's size), the proportion of tangible assets, and the return on assets (which controls for a firm's profitability) are all positively related to a worker's productivity and are also statistically significant at any conventional significance level. In broad terms, all these variables are related to a firm's operating and financial performance. Resorting to general economic intuition, it seems reasonable that better-performing firms also enjoy more employee productivity. The coefficient on the firm's book-to-market ratio is negative, which would advocate for a negative relationship with employee productivity, however, this is not statistically significant at any reasonable confidence level, and thus no meaningful association can be done.

The macroeconomic control variables are both statistically significant at the 1% significance level. The results point to a positive relationship between GDP growth rate and productivity. Economically, it seems plausible that those states with more productive employees are also the ones registering higher GDP growth rates. On the opposite end, a higher unemployment rate is associated with lower employee productivity. Indeed, a higher unemployment rate may be a signal of bad economic conditions, times which are usually characterized difficulties in several angles of employee's lives, which may decrease their motivation and hinder their productivity.

The R-Squared of this regression suggests that approximately 87.5% of the variation in employees' productivity is explained by the model's inputs. The model's explanatory power is relevant, since most of the variation in employee productivity can be explained by it.

Table 4. Labour Productivity and UI benefits. This table summarizes the output results from the regression models of employee productivity on UI generosity. In all regressions, state-, year- and firm-fixed effects were included, as well as a vector of control variables comprised of economic indicators (GDP growth rate and unemployment rate) and firm-specific aspects (log of sales, the proportion of tangible assets, return on assets and book-to-market ratio). Standard errors are reported in parentheses. Statistical significance at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

VARIABLES	(1) max total benefit	(2) max duration	(3) max weekly benefit	(4) no financial crisis
Log of max total benefit$_{t-1}$	-0.0518**			-0.0377*
	(0.0214)			(0.0221)
Max total weeks $_{t-1}$		0.00326		
		(0.00211)		
Max total amount $_{t-1}$			-0.000442***	
			(5.61e-05)	
GDP Growth Rate	0.403***	0.461***	0.383***	0.347***
	(0.108)	(0.108)	(0.107)	(0.124)
Unemployment Rate	-0.814***	-0.817***	-0.781***	-0.552*
	(0.282)	(0.282)	(0.281)	(0.310)
Log Sales	0.218***	0.218***	0.218***	0.207***
	(0.00564)	(0.00564)	(0.00563)	(0.00591)
Proportion of Tangible Assets	0.422***	0.425***	0.404***	0.420***
	(0.0261)	(0.0261)	(0.0261)	(0.0280)
Return on Assets	0.275***	0.273***	0.287***	0.193***
	(0.0498)	(0.0498)	(0.0497)	(0.0542)
Book-to-Market Ratio	-0.00201	-0.00270	-0.00272	-0.00619
	(0.00783)	(0.00783)	(0.00781)	(0.00841)
Constant	-1.172***	-1.732***	-1.472***	-1.223***
	(0.203)	(0.0797)	(0.0601)	(0.210)
Observations	13,676	13,676	13,676	11,963
R-squared	0.875	0.875	0.876	0.871

It appears that the firms located in states with more generous unemployment insurance programs register lower levels of labour productivity than those firms located in states with less generous unemployment insurance programs. These empirical results are in line with the ones of Darrough, Kim, and Zur (2019), supporting the rationale that more unemployment insurance benefits create moral hazard problems on the workers' end, and thus their productivity is hindered. Although no pure causality can be inferred from this analysis, this study supports the rationale behind the efficiency wage theory. Accordingly, better unemployment insurance

benefits lead workers to exert lower effort, as there is a good outside option and therefore workers are not too concerned with what they might give up if faced with unemployment. In turn, this lack of incentives is reflected in lower employee productivity levels. Labour productivity affects several dimensions of a firm's financial statements and performance evaluation. For instance, Margaretha and Supartika (2016) find that productivity has a positive impact on a firm's financial performance, measured by its profitability ratio.

In order to test for the robustness of the empirical findings and in an to attempt to understand the drivers of such results, alternative measures of unemployment insurance generosity were implemented. These two measures can capture whether workers care more about the amount of unemployment benefits they receive or about the time they are protected against unemployment. Besides measuring unemployment insurance generosity as the natural logarithm of the product of the maximum number of benefit weeks and the maximum weekly amount, unemployment insurance generosity was also measured as the natural logarithm of the maximum number of benefit weeks (*max_weeks*) and the natural logarithm of the maximum weekly benefit amount, measured in dollars (*max_amount*). Thus, the following two regression models were estimated:

$$output\_per\_emp_{ist} = \beta_0 + \beta_1 max\_weeks_{ist-1} + \beta_2 Controls_{ist} + a_i + \mu_s + \gamma_t + \\ + \varepsilon_{ist}\,, \tag{5}$$

$$output\_per\_emp_{ist} = \beta_0 + \beta_1 max\_amount_{ist-1} + \beta_2 Controls_{ist} + a_i + \mu_s + \\ + \gamma_t + \varepsilon_{ist}\,, \tag{6}$$

where both measures of unemployment generosity are in the period *t-1*, precisely because of their delayed effect on the key variable of interest. The same vector of control variables, including a firm's sales, proportion of tangible assets, return on assets, book-to-market ratio, state's GDP growth rate, and unemployment rate were included in both models. Following the same approach as before, in both specifications, firm (a_i), state (μ_s), and year (γ_t) fixed effects

were included as to guarantee that the estimates are not reflecting just cross-sectional correlations or economic factors that are specific to a certain year.

Table 4 also reports the estimation outputs of these two models. The estimated coefficient on the maximum number of weeks an unemployed individual can benefit from unemployment insurance is positive, however this coefficient is not statistically significant at any conventional confidence level, so no conclusions can be drawn from this model. This insignificance may be attributed to the minor variation of this variable in the sample. Even though the duration of the unemployment insurance benefits should not be disregarded, it seems that the weekly unemployment benefit amount is the main driver of the association between unemployment insurance generosity and productivity.

The coefficient on the maximum weekly benefit amount in panel (3) is statistically significant at any reasonable confidence level. This suggests that a 100 log-point increase in the maximum weekly benefit amount is associated with a 0.044 percentage points decrease in workers' productivity (in the following year), keeping all the remaining variables constant. Moreover, this model also has a considerable explanatory power, with an R-Squared of 0.875. This result is in line with the previous intuition that a more generous unemployment insurance scheme exacerbates the exiting moral hazard problems and thus worker's productivity decreases.

In order to further check the robustness of the results obtained, I analysed the sample without the period of the Global Financial Crisis (2007-2008), which had a deep impact on unemployment. This is particularly important since this can be considered an extreme event that does not occur during the typical business cycle. Therefore, including such a period could potentially bias the results. Taking this approach, Darrough, Kim, and Zur (2019) find no results significantly different from their main conclusion, suggesting that this peculiar time is not the driver of their conclusions. Table 4 reports the output of this analysis. Indeed, the results are

similar to the main ones: a negative relationship is still observed between unemployment insurance generosity and workers' productivity, yet the coefficient on unemployment insurance generosity becomes statistically significant only at a 10% significance level. Additionally, excluding the time period corresponding to the Global Financial Crisis has a marginal impact on the model's explanatory power since the R-Squared decreases from a value of 87.5% to a value of 87.1%. Overall, similar results are obtained whether the Global Financial Crisis is included or not, thus it does not seem that this period, and the corresponding extraordinary measures adopted, are biasing or misleading the results obtained.

In order to better understand the relationship established between unemployment insurance generosity and employee productivity, an additional regression model, only focused on the subsample of labour-intensive industries was considered. By nature, these industries rely heavily on human capital and thus the different unemployment compensation levels arising from changes in unemployment generosity are amplified as they affect the majority of the firm's capital (Agrawal and Matsa 2013). The results obtained (Appendix, Table 1) suggest that the negative relationship between unemployment insurance generosity and employee productivity is stronger when considering only the labour-intense industries. This implies that the moral hazard issues arising from more generous unemployment insurance programmes are amplified in industries that are more reliant on human capital.

All in all, it was found that increases in unemployment insurance generosity are followed by decreases in output per employee (productivity). In fact, if employees are more protected against the detrimental effects of unemployment, their incentives to exert high effort decrease, and consequently, their productivity declines.

Credit Ratings and Unemployment Insurance

Theoretical Background

There is extensive literature on the importance of the assessment of the level of credit risk a firm has and the implications the respective disclosures have on the financial markets. The elaboration of ratings dates back to a period before World War I (early 1900s). The reality at that time was completely different, not only in terms of the amount of information available for investors, but also in terms of the accounting and public regulatory framework, orientating the companies' financial spectrum (Pogue and Soldofsky 1969). Nowadays, the market environment is grounded on transparency, not only at the level of the financial accounting standards but also at the firm level, who are subject to strict public regulation forcing public entities to disclose all relevant information to investors. On top of that, there are independent companies which work on the assessment and monitoring of the credit risk of the entities, the so-called Credit Rating Agencies (CRAs). To name a few, Moody's, Standard & Poor's, and Fitch are the most renowned agencies in the US.

The regulation that is now in place forces companies to disclose a wide variety of key information regarding their financial performance. Wakeman (1998) argues that, assuming markets are efficient, if CRAs summarize only the information publicly disclosed, then the agencies would end up only lowering information costs, both to the borrowers and to the lenders. However, since this information was already publicly disclosed, Credit Rating Agencies would not necessarily fuel the market with new data on the financial performance of the company. Notwithstanding, Credit Rating Agencies claim they have access to information that one cannot encounter widely available in the market, mainly regarding acquisitions, expansion or new product plans, and debt issuance (Goh and Ederington 1993). If that is the case, the assessment of credit ratings would make sense to fill the gaps existent in the market,

namely the asymmetry of information from the investors' perspective, enhancing the efficiency of the market.

In a more practical approach, bond ratings are considered crucial for corporates to access some financing means. According to Donaldson (2000), "A" is the lowest rating companies could show in order to be included in the portfolios of some of the major names within the investing industry. From financial theory, it follows that riskier firms would be forced to pay a higher premium to raise financing. This, alongside with the borrowers' preference to maintain business relationships with financial institutions that have a good reputation in the markets, makes it undoubtedly harder to raise funds if the firm has a credit quality much lower than "A".

Expanding debt to a level that would potentially trigger a drop in the rating below the threshold "A", would endanger the availability of financing available for that firm via debt markets in the future or if an emergency occurs. Donaldson (2000) then shows that ratings are relevant for financing decisions, as they constitute a rule of thumb to include companies in or exclude them from reputable investors' portfolios.

More generally, as the credit rating affects investors' perception regarding the risk of default of the corresponding firm, it ends up affecting the flows of credit the firm gets (Kerwer 2005). Rating-based criteria has been introduced in the markets as a measure of financial health. Illustrative examples of this are the bondholders and banks which include covenants based on ratings, and pension funds with investment mandates that exclude the possibility of investing in bonds with high likelihood of default.

Goh and Ederington (1993) argue that a deterioration in the firm's prospects regarding future performance and an increase in the level of debt contribute to a downgrade in rating, albeit originating different reactions in the stock market.

Hwang, Chung, and Chu (2010) also show, using a prediction method, how a change in different financial health indicators of a company might affect its credit rating. The paper resorts to the size, financial leverage, coverage ratios, cash flows, profitability ratios, and liquidity ratios to address what it calls "financial health". It concludes that higher firm size, larger cash flows, higher coverage of interest expense, higher profitability, or lower leverage, are associated with a better S&P's Long-Term Rating category.

Horrigan (1966) enriches the literature by arguing that there are other financial ratios relevant to determine or help predict ratings of corporate bonds. Examples of that are total assets, profit margins, and long-term solvency ratios.

Another research conducted by Hovakimian, Kayhan, and Titman (2009) reinforces the idea that credit ratings are fundamental, especially for managers. They consider that management plays an important role in capital structure decisions. Since managers perceive highly rated firms as the most prestigious ones within the corporate world, they tend to make decisions that conduct to an upgrade of the credit rating.

Moreover, Hovakimian, Kayhan, and Titman (2009) found that when firm ratings are below the target ones, firms tend to adopt conservative financial policies. Hence, firms become more likely to reduce leverage, to prefer security issuance for capital raising over additional debt, to decrease dividend payouts, and to reduce the engagement in acquisitions activity. Basically, firms tend to adopt financing choices that, to a certain extent, can offset what moved them away from their target capital structure and rating.

Bai (2021) shows that labour market frictions contribute to the understanding of credit risk in the bond market. A positive relationship was found between the unemployment level and the credit spreads. The variables appear to be connected particularly during the period of Great Depression, when a rise of one percentage point in the unemployment rate is associated with

an increase of 13.4 basis points in the Moody's Baa-Aaa credit spread. Bai (2021) extends the analysis to the rigidity of search costs. When the unemployment rate is higher, the labour market gets congested with the unemployed workers, who should be actively looking for being reintegrated in the labour market. This, in turn, reduces the period of time a vacancy is opened, as it is easier to be filled given the higher labour supply. However, there is a fixed variable in the search costs, as these cannot fall further when the labour market reaches a point in which a vacancy is almost immediately filled. Regardless of the macroeconomic outlook, firms will always have to cover these fixed search costs, which in turn, increases the credit risk, as the ability to repay the firm's creditors deteriorates, especially in a poor profitability environment. So, Bai (2021) evidences the countercyclicality of corporate bond default rates in the paper, increasing in recessionary periods, when the unemployment rate is higher and productivity is lower.

If credit ratings are, in fact, informative and reliable, changing them would trigger a reaction in the stock market as well. For example, when there are good news about the cash flows of a company, then its bond and stock prices are expected to move in the same direction (Jorion and Zhang 2007).

Dichev and Piotroski (2001) document that there is a stronger reaction in the stock price to a rating downgrade compared to an upgrade, and the "downside" field is where the credit rating agencies play their most crucial role. Gonzalez et al. (2004) follow the same reasoning of a stronger effect of credit rating downgrades on stock price. The authors argue that firms have higher propensity of disclosing good news directly to the market, instead of waiting for Credit Rating Agencies to do that. Therefore, the good news on the company financials are typically incorporated by the market prior to the upgrade announcement. However, firms are typically reluctant to divulgate to the market unfavourable information regarding their financials. This is the case in which credit rating agencies play the most crucial role, and also the most informative

one. A credit rating downgrade is associated with bad prospects for the company's financial health, being the CRAs responsible to disclose it first-hand to the markets. As it is more likely for a rating downgrade to be a surprise for the market than an upgrade, the investors' reaction is also stronger in the downside scenario.

Almeida and Philippon (2007) model *ex-post* costs of financial distress and the tax advantages of using debt for each credit rating. The results show that firms with worse credit ratings face higher financial distress costs, but also greater tax benefits from debt. The authors argue that the marginal distress costs might play an important role in explaining the reluctance of firms to increase leverage, although they could benefit from greater tax advantages.

Agrawal and Matsa (2013) also contributed to the literature of credit ratings, establishing a connection between firms' credit ratings and the wage premium demanded by employees. It is argued that the size of this compensation (wage premium) increases as the credit rating deteriorates, evidencing that the unemployment risk perceived by potential workers plays an important role in the determination of capital structure, specifically on what concerns leverage. However, Agrawal and Matsa (2013) show that the wage premium demanded would be much higher if there were no unemployment insurance benefits in place, for each credit rating analysed.

Results

Credit ratings provide important information to the market. In order to attribute such rating, Credit Rating Agencies take several firm aspects into account. Indeed, credit ratings are rooted and intrinsically impacted by several of the financial aspects studied in this paper, namely, a firm's level of debt, the maturity of such debt, its capacity to meet several of the financial obligations, such as interest obligations, and indirectly by a firm's overall productivity, which impacts its operational activity – the primary source of cash flow generation.

To develop some insights on the relation between a firm's credit rating and unemployment generosity, the following regression model was estimated:

$$increase\_cr_{ist} = \beta_0 + \beta_1 log\_total\_benefit_{ist-1} + \beta_2 Controls_{ist} + \nu_i + \omega_t + \\ + \theta_s + \epsilon_{ist}\ , \tag{7}$$

where, *increase_cr* is a dummy variable which takes on the value 1 if a firm *i*, located in state *s* experienced a credit rating upgrade in year *t*, and 0 otherwise. The variable *log_total_benefit* measures the log of the product of maximum unemployment duration and maximum weekly benefit amount. Similar to the analysis performed in other parts of this study, unemployment insurance generosity is included in the model with a one-year lag because it takes time for the several stakeholders to react to changes in this variable. A set of control variables was introduced in the model, which included multiple firm financial metrics, namely the natural logarithm of the sales volume (*log_sales*), the proportion of tangible assets (*tan_to_assets*), return on assets (ROA), the book-to-market ratio (*BM*), the interest coverage ratio (*intcov_ratio*), and a firm's debt-to-equity ratio (*de_ratio*). Moreover, each state's macroeconomic conditions were accounted for by introducing two control variables: the GDP growth rate (*gdp_grate*) and the unemployment rate (*unemployment_rate*). In order to prevent spurious conclusions, a set of firm-, time- and state-fixed effects was introduced.

It would be reasonable to think that productivity could also be relevant for a firm's credit rating through its fundamental impact on a firm's ability to generate revenues. To test whether this would in fact bring some added value to the model, workers' productivity was introduced in the regression (Appendix, Table 2) as a control variable. Yet, the adjusted R-Squared of this regression decreased upon the inclusion of such variable, meaning that estimating the model with output per employee would only be generating noise. This behaviour may be explained by the fact that worker's productivity is not the most relevant factor impacting a firms' credit rating. In fact, total factor productivity should be more suitable since it accounts for both

workers' and capital productivity. Moreover, introducing the proportion of short-term debt as a control variable (Appendix, Table 3) also decreased the adjusted R-Squared of the regression, consequently, it was not included in the model either.

In the Leverage and Unemployment Benefits section, the relationship between unemployment insurance generosity and a firm's debt to equity ratio was studied. In this section it was hypothesized that a more generous unemployment insurance scheme is associated with a lower debt-to-equity ratio. If a firm lowers its debt levels, it will lower its debt-to-equity ratio accordingly. This, in terms of credit rating is materialised in a better rating, assuming no other relevant firm characteristic is changed. If this is the case, then this may contribute to explain a relationship between unemployment insurance generosity and a firm's credit rating: a more generous unemployment insurance scheme is associated with lower debt levels, which in turn is associated with a higher probability of the firm improving its rating. According to the results displayed in table 6, the coefficient on the firm's debt to equity is statistically significant at any reasonable significance level. This coefficient is negative, suggesting that a higher debt-to-equity ratio is associated with a lower probability of a firm seeing its credit rating upgraded.

A firm's interest coverage ratio should also be a relevant component of a firm's credit rating. Indeed, a firm with a higher interest coverage ratio demonstrates a better ability to pay interests and, in this sense, to remunerate its debtholders, which should increase investor's confidence in the firm and thus improve a firm's chances of seeing its credit rating move upwards. In fact, if a higher interest coverage ratio was associated with a better probability of increasing a firm's rating, then, there would be another mechanism through which firms located in states with a more generous unemployment insurance scheme have a higher probability of improving their credit ratings: in the Interest Coverage Ratio and Unemployment Insurance section, it was found that a more generous unemployment insurance scheme is associated with higher interest

coverage ratios, which would then be associated with better credit ratings since the firm demonstrates a strong ability to meet its interest obligations.

Table 6. Credit ratings and UI benefits. This table reports the results of the regression model that estimates the impact of unemployment insurance generosity on the probability of a firm experiencing a credit rating upgrade. A vector of control variables, including GDP growth rate, unemployment rate, sales, the proportion of tangible assets, return on assets, book-to-market ratio, interest coverage ratio, and debt-to-equity ratio was considered in the regression. Standard errors are reported in parentheses. Statistical significance at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

	(1)
VARIABLES	max total benefit
Log of max total benefit$_{t-1}$	0.00464
	(0.0310)
GDP Growth Rate	-0.176
	(0.156)
Unemployment Rate	-0.0776
	(0.408)
Log Sales	-0.0281***
	(0.00817)
Proportion of Tangible Assets	-0.0599
	(0.0379)
Return on Assets	0.823***
	(0.0770)
Book-to-Market Ratio	-0.0869***
	(0.0114)
Interest Coverage Ratio	-0.000204
	(0.000296)
Debt-to-Equity Ratio	-0.00673***
	(0.00153)
Constant	0.301
	(0.294)
Observations	13,676
R-squared	0.174

Despite its pitfalls in estimating, and more importantly in performing forecasts when the dependent variable is categorical, OLS was used to estimate the regression model. These results should be evaluated with some critical sense and thus, only a high-level analysis of the direction of the relationship was performed to develop some intuition on the subject. The regression outputs are reported in Table 6. Even though the coefficient on unemployment insurance

generosity is not statistically significant at any reasonable significance level, and thus no conclusion can be drawn from it, if it was statistically significant, its positive value would be indicative that an increase in the unemployment insurance generosity is associated with a higher probability of the firm improving its credit rating. Moreover, the coefficient on interest coverage ratio is statistically significant, so no conclusions can be drawn from these results. As it was previously mentioned, the coefficient on a firm's debt-to-equity ratio presents some statistical significance. However, because of the limited explanatory power of this regression, the magnitude of this coefficient is not scrutinized and only the direction of the relation between the two variables is taken into consideration.

Limitations and Suggestions for Further Research

As it is expected, this study contains several limitations, and some caveats should be taken into consideration when analysing the final conclusions. First and foremost, it is important to highlight that only data for the United States was collected. Henceforth, the conclusions drawn are bounded to the United States, which means that the results obtained should be locally interpreted and it is important to establish that they are intimately related to the organizational structure of the United States unemployment insurance scheme.

Moreover, another issue arises since this study considers that each firm is located in a single state, the one where it is headquartered. In reality, it is observed that several companies have branches all over the United States and even in other countries of the globe. Therefore, these entities are subject to more than just one particular state's law, which is not accounted for in this study. This may originate biased results since only one state's law is considered for each company. To overcome this obstacle, two approaches could be taken. First, the companies presenting a high degree of geographic dispersion could be excluded from the dataset. However, this would possibly give rise to even more concerns since nowadays, the whole globe is seen as a truly global village and companies are spread over all geographies. Instead, if detailed data for each company and the respective unemployment insurance laws they are subject to could be collected, the measure of unemployment insurance generosity could be calculated as an average of the total maximum benefit all workers of the firm in all locations are able to get.

During the data collection process, precautions to avoid and minimize sampling bias were taken. Indeed, no data point was handpicked in an attempt to avoid ending up with a sample in which some members of the population are more likely to be sampled than others. However, the data collected in this study is limited to those companies that report and have available financial statements in Compustat.

Another limitation that is inherent to any study resorting to regression analysis is related to the fact that unobserved variables, other than the ones included as controls in the regressions, may be affecting the dependent variable in the respective regression model. The exclusion of such variables may create an unobserved variable bias problem. In line with the academy and previous studies on this subject matter, a robust vector of control variables was introduced in the regression models as to minimize the omitted variable bias problem.

As it was previously mentioned, the results obtained are geographically bounded to the United States, and therefore one should be cautious regarding policy recommendations, in particular for those countries outside the United States. Indeed, the unemployment insurance schemes are considerably different across countries, namely in the duration and in the amount of the unemployment benefit.

For instance, the Swedish unemployment scheme is extremely different from the one of the United States. Landais LSE Arash Nekoei et al. (2020) explore the Swedish unemployment insurance programme, according to which upon unemployment, every single worker is entitled to receive a minimum amount of benefits. However, in Sweden, the unemployment insurance scheme gives workers the option of buying additional unemployment insurance at a uniform premium, that is set by the government. This way, in the Swedish unemployment scheme there is a basic coverage component, that is mandated, and an option for a more generous unemployment benefit, that is voluntary. This combination of a mandated and voluntary unemployment insurance scheme is also followed by other countries such as Iceland, Denmark and Finland. Studying the impact of unemployment insurance generosity on firm financial policies in these countries requires different measures of unemployment insurance generosity than the ones this paper resorted to. Hence, studying the relation of unemployment insurance generosity in firm financial decisions in these countries is left as a suggestion for future research. Indeed, comparing the results of such research with the results obtained in this

research could possibly shed some light on the several pros and cons of different unemployment insurance schemes from the perspective of their impact of firm's key items.

In other parts of Europe, the unemployment insurance scheme is more identical to the one in the United States, in terms of structure. Arcanjo (2012) analyses some policy reforms happening in the early 2000s regarding the unemployment insurance scheme in France, Germany, Portugal, and Spain. The unemployment insurance scheme in these countries is similar to the one of the United States as it relies both on eligibility criteria and in a contributary framework. This means that access to unemployment insurance benefits is contingent on previous contributions to the system and on meeting some eligibility criteria. In general terms, Arcanjo (2012) concluded that in the time period studied, France, Germany, Portugal and Spain, implemented reforms that followed a common trend: there was a shift towards stricter eligibility criteria, namely tighter individual behaviour requirements and better monitoring of those unemployed beneficiaries. One of the main goals of these policy reforms was to decrease long-term benefit dependency. Despite being, in broad terms, similar to the unemployment insurance scheme of the United States, future research on these countries' unemployment insurance schemes could reveal itself extremely valuable and enriching since there are fundamental cultural differences between the countries that can lead to extremely different conclusions.

To have more insights and more robust conclusions, some additional research could be conducted in the future: in the recent pandemic crisis, there were several temporary changes in unemployment insurance laws. Therefore, conducting a study focused on such a volatile and stressful period would provide powerful tools for future policy formulation. Indeed, it is in periods of functional disruption that unemployment insurance benefits are most needed by the individuals.

Additionally, a targeted research could be performed in those firms that are facing financial constraints, in financial distress, and on the verge of bankruptcy, since workers of those firms should be more vulnerable and exposed to unemployment risk. Hence, changes in unemployment insurance generosity should deeply impact these workers and perhaps have a stronger influence on firm's financial policies.

Lastly, as it was referred in the Credit Ratings section, the analysis performed was extremely high-level and limited to the available data regarding Credit Ratings in Compustat. Hence, I recommend future researchers to perform an in-depth analysis of the relationship between a firm's credit rating and unemployment insurance generosity.

Conclusions

Motivated by the growing recent literature studying how unemployment risk interacts with different aspects of the corporations, I had the opportunity to analyse the intertwining of these variables further and gain a deeper insight of the effects of state-level labour public policies, such as the unemployment insurance programmes, on firms' operating and financial indicators. This paper builds on academics' giant shoulders to explore the connection between the generosity of the unemployment insurance benefits and five main corporate indicators: leverage, as measured by the debt-to-equity ratio; the ability of firms to meet their interest obligations, represented by the interest coverage ratio; labour productivity, considered as the output per employee; debt maturity, accounted for with the proportion of short-term obligations relative to the total debt obligations (with the short-term to total debt ratio); credit rating upgrades, which assumes the value of 1 when the credit rating improves and 0 if it remains the same or worsens (binary variable).

Using the United States of America as the geography allowed for an evaluation of the different responses firms have to changes in unemployment insurance laws in the different states. The fact that these states have sovereignty on the unemployment insurance matter makes this analysis very interesting, as it resembles a quasi-natural experiment. This is reinforced, in part, because the states are under the umbrella of a common country, with the same constitutional foundations, making states more comparable among each other.

Combining data from multiple sources, I was able to retrieve information on key macroeconomic indicators at the state level, namely gross domestic product growth rate and unemployment rate, as well as to extract data for more than two thousand American companies, over the considered period of study, which comprises more than thirty decades. In fact, the first observation in the dataset used in this paper dates back to 1981 and the last observation is as

recent as 2017, even though the first four years of data are disproportionally unpopulated comparative to the remaining ones.

Through the empirical research performed, it was founnd that leverage decreases after positive shocks on unemployment insurance benefits. This evidence is consistent with the theory that as leverage increases, workers require higher wages and consequently, wages start resembling debt coupons. In turn, firms see themselves obligated to decrease debt, leading to a crowding-out effect of financial leverage. Therefore, more generous states in terms of unemployment aid may unintentionally induce companies located in their territory to prefer the issuance of equity over debt. This setting does not let those companies enjoy some of the benefits that come with more leverage, particularly the tax shield benefits. This result should, nonetheless, be taken with caution, as it is not robust to any of the tests undertaken.

Regarding the interest coverage ratio[3], a positive association between the ratio and unemployment insurance generosity is established. According to the results obtained, when workers' unemployment costs diminish (via more generous unemployment insurance programmes), there is a reduction in workers' requirements for compensating wages. Thus, corporations are left with more cash to service debt. Creditors then see this as a good sign and offer those firms more favourable debt contract terms, in the form of lower interest payments, which makes it even easier for firms to meet the interest coverage ratio covenant often present in financial agreements. This finding is robust to the two most relevant tests performed, making us draw the conclusion that when unemployment protection is strong, firms can more easily meet their interest obligations.

In what concerns productivity and the role unemployment benefits play on output per employee, the regression model proves to be quite strong, presenting a high coefficient of determination.

[3] This work project was developed in group, and a detailed analysis of debt maturity was performed by Marta Fernandes, student number 38914. Hence detailed information regarding this metric can be found in her individual report. For the sake of completeness and understandability of the analysis performed, her conclusions are included in this report.

According to the regression output, productivity drops following reductions in the unemployment risk (stemming from more generous unemployment insurance benefits). Theoretically, this relation goes along the same vein as other publications which argue that employees, when working in a state that offers more advantageous conditions to those unemployed (in the form of generous unemployment benefits), do not have to worry too much about becoming jobless. If that were to be the case, employees would have considerable help from the state, whether in terms of amount of the unemployment benefit or of its duration. This works as a disincentive for workers to exert high effort in performing their daily tasks, making the output per employee decline. All in all, it was found evidence that better unemployment insurance schemes create moral hazard problems, ultimately resulting in the decline of enterprises' human capital productivity. Besides the powerful R-squared, the two main robustness tests confirm this result, which makes us confident about the negative association between unemployment insurance generosity and productivity.

With respect to debt maturity[4], the results obtained point in the direction of a negative association between unemployment insurance benefits and shorter-term loan maturity. Despite the conflicting views in literature, this study concludes that firms headquartered in US states with more generous unemployment benefits are provided more favourable loan conditions, in terms of maturity (that is, creditors allow firms to have the maturity extended over a longer period). This is a by-product of the lower risk exposure that companies in these states present due, in turn, to the lower labour costs (recall that employees do not demand such high compensating wages when the unemployment risk is low, i.e. when the unemployment scheme is more generous).

[4] This work project was developed in group, and a detailed analysis of interest coverage was performed by Rita Fernandes, student number 38903. Hence detailed information regarding this metric can be found in her individual report. For the sake of completeness and understandability of the analysis performed, her conclusions are included in this report.

Lastly, in what regards credit ratings, I would expect to observe a positive relationship between the unemployment insurance benefits and the credit ratings, due, in part, to the negative association of the former with leverage. Since I find that more generous unemployment benefits are related to lower levels of debt and the latter are, in turn, often translated into a better credit rating, it would be reasonable to find a positive coefficient when regressing credit rating upgrades on unemployment insurance generosity (along with the other control variables). However, the main coefficient is not statistically significant, so this hypothesis cannot be corroborated.

More broadly, when taking these findings into account, one should bear in mind that it is hard to establish causality, even though the model specifications (especially, with the inclusion of lags and being built under the fixed effects methodology) may invite one to be tempted to do so.

To conclude, this research suggests that many of the corporate dimensions, ranging from operating to financial performance, are impacted by labour market frictions, and as such, unemployment insurance policies should take these factors into consideration when being developed by the competent departments in each state.

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Appendix

Figure 1. Total Unemployment Benefits Evolution. This graph showcases the evolution of the average maximum total unemployment insurance benefit across states over time

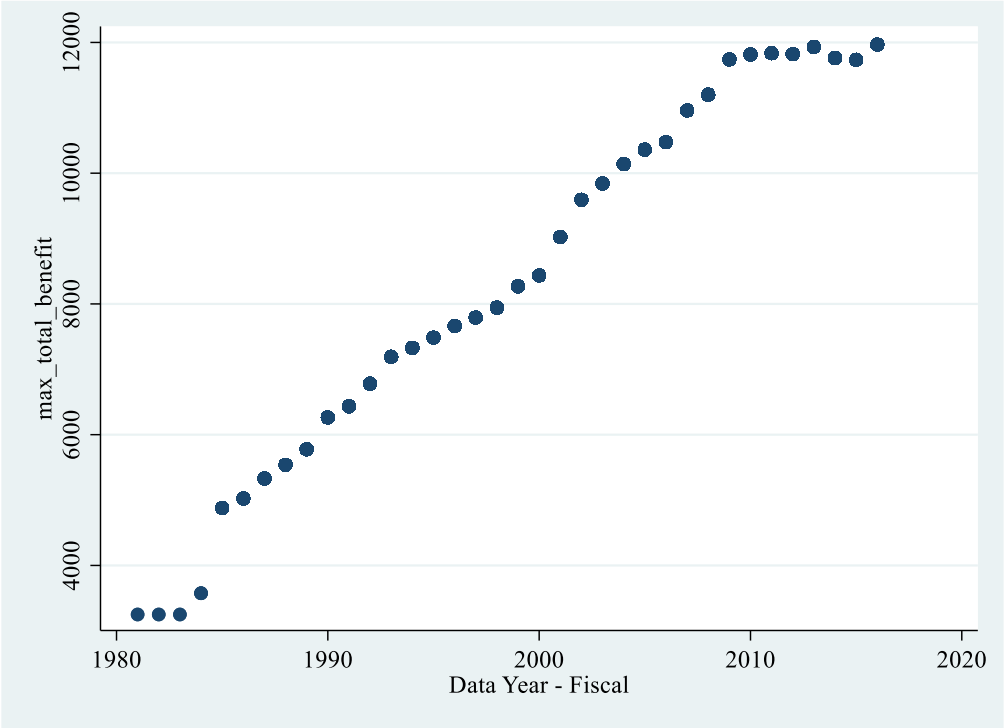

Table 1. Productivity and UI benefits. This table summarizes the output results from the regression model of employee productivity on UI generosity, for the subset of firms considered to be labour-intensive. In this regression, state-, year- and firm-fixed effects were included, as well as a vector of control variables comprised of economic indicators (GDP growth rate and unemployment rate) and firm-specific aspects (log of sales, the proportion of tangible assets, return on assets and book-to-market ratio). Standard errors are reported in parentheses. Statistical significance at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

VARIABLES	(1) Subset of labour-intensive industries
Log of max total benefitt-1	-0.141**
	(0.0570)
GDP Growth Rate	0.285
	(0.242)
Unemployment Rate	-0.644
	(0.656)
Log Sales	0.397***
	(0.0133)
Proportion of Tangible Assets	1.354***
	(0.103)
Return on Assets	0.698***
	(0.126)
Book-to-Market ratio	0.0815***
	(0.0179)
Constant	-2.452***
	(0.534)
Observations	3,328
R-squared	0.880

Table 2. Credit Ratings with Productivity as control. This table presents the estimations for the credit ratings regression on unemployment insurance benefits upon the introduction of employee productivity as an additional control variable. Standard errors are reported in parentheses. Statistical significance at the 1%, 5% and 10% is denoted by ***, **, and *, respectively.

	(1)
VARIABLES	max total benefit
Log max total benefits$_{t-1}$	0.00432
	(0.0310)
GDP Growth Rate	-0.174
	(0.156)
Unemployment Rate	-0.0832
	(0.408)
Log sales	-0.0266***
	(0.00866)
Proportion of Tangible Assets	-0.0571
	(0.0383)
Return on Assets	0.825***
	(0.0771)
Book-to-Market Ratio	-0.0869***
	(0.0114)
Interest Coverage Ratio	-0.000205
	(0.000296)
Debt-to-Equity Ratio	-0.00671***
	(0.00153)
Output per Employee	-0.00660
	(0.0131)
Constant	0.293
	(0.295)
Observations	13,676
R-squared	0.174

Table 3. Credit Ratings with the proportion of short-term debt as control. This table presents the estimations for the credit ratings regression on unemployment insurance benefits upon the introduction of proportion of short-term debt as an additional control variable. Standard errors are reported in parentheses. Statistical significance at the 1%, 5% and 10% is denoted by ***, **, and *, respectively.

	(1)
VARIABLES	max total benefit
Log max total benefits$_{t-1}$	0.00444
	(0.0310)
GDP Growth Rate	-0.177
	(0.156)
Unemployment Rate	-0.0760
	(0.408)
Log sales	-0.0279***
	(0.00819)
Proportion of Tangible Assets	-0.0589
	(0.0380)
Return on Assets	0.822***
	(0.0771)
Book-to-Market Ratio	-0.0869***
	(0.0114)
Interest Coverage Ratio	-0.000193
	(0.000298)
Debt-to-Equity Ratio	-0.00674***
	(0.00153)
Short-term to Total Debt	-0.00824
	(0.0233)
Constant	0.302
	(0.294)
Observations	13,676
R-squared	0.174